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SPECIFICATIONS

FOR

CONSTRUCTION OF

STEEL CARGO STEAMERS

Reciprocating Engs.

8800 Tons, D. W. Capacity

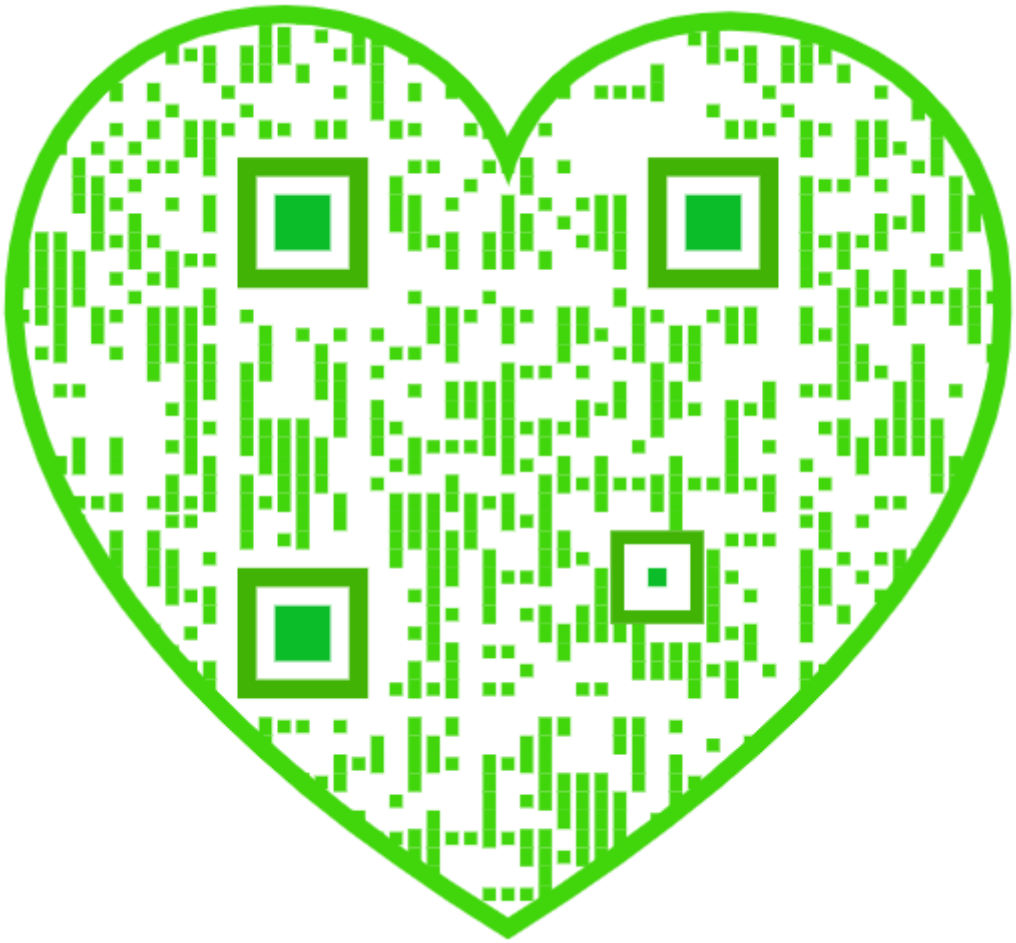
Hulls 33 x 34

BUILDERS

COLUMBIA RIVER SHIP BUILDING CORPORATION

PORTLAND, OREGON

SWEENEY, VARNEY & STRAUB, PRINTERS, PORTLAND, ORE.



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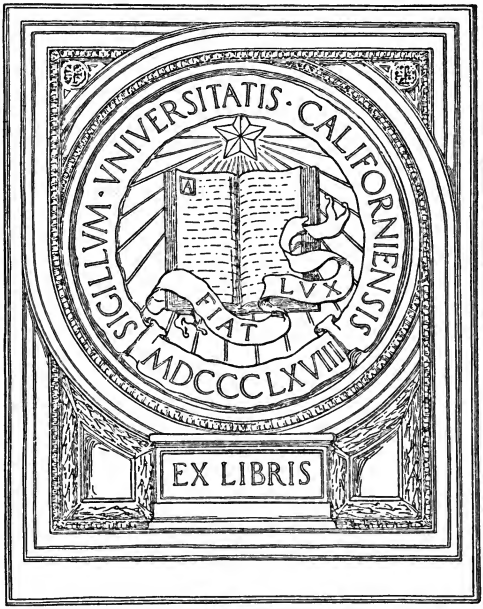

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SPECIFICATIONS

FOR

CONSTRUCTION OF

STEEL CARGO STEAMERS

8800 Tons, D. W. Capacity

BUILDERS

COLUMBIA RIVER SHIP BUILDING CORPORATION

PORTLAND, OREGON.

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SPECIFICATIONS

FOR CONSTRUCTION OF

STEEL CARGO STEAMERS

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1. GENERAL PARTICULARS.

Length over all	423 ft. 9 in.
Length between perpendiculars	410 ft. 5½ in.
Beam Molded	54 ft. 0 in.
Depth molded at lowest point of shear	29 ft. 9 in.
Depth molded amidships	30 ft. 2 in.
Draft Loaded	24 ft. 0½ in.
Deadweight, approximately	8600 tons
Speed	10½ knots
Block Coefficient	.805

2. APPROXIMATE CARGO CAPACITIES.

As Oil Burner.

Cargo Holds, Grain (top of beams and to skin of ship)	439867 cu. ft.
Cargo Holds, Grain (top of beams and to inside of sparring)	423299 cu. ft.
Cargo Holds, Bale (under side of beams and inside of spar)	402539 cu. ft.
Cargo, Forecastle, Bridge and Permanent Bunker—	
(Top of beams and to skin of ship)	53108 cu. ft.
(Top of beams and inside of sparring)	51888 cu. ft.
(Under side of beams and to inside of battens)	48296 cu. ft.
Fuel Oil Capacity (total)	8418 bbls.

As Coal Burner.

Cargo Holds, Grain (top of beam and to skin of ship)	439867 cu. ft.
Cargo Holds, Grain (top of beam and to inside of sparring)	423299 cu. ft.
Cargo Holds, Bale (under side of beam and inside of sparing)	402539 cu. ft.
Cargo Forecastle Bale	9071 cu. ft.
Coal Bunker (total)	977 tons
Fresh Water (total)	214 tons
Refrigerator Space (total)	1278 cu. ft.
Coal Bunker, Permanent	249 tons
Coal Bunker, Reserve	684 tons
Coal Chutes	44 tons

3. GENERAL DESCRIPTION.

The vessel will be a steel single Screw Cargo Steamer of the poop, bridge and forecastle type with machinery amidships. There will be two masts with four 5-ton cargo booms on each mast, and two derrick posts, each fitted with one 3-ton cargo boom. The forward hold will be divided into three compartments, the after hold into two compartments, by transverse watertight bulkhead. All bulkheads will be carried to upper deck, except bulkhead at Frames 108 and 42 extend to second deck only.

All fuel oil piping and pumps will be installed complete. Fuel oil will be carried throughout double bottom, except in way of machinery space, and in settling tank, as shown on plans. Water ballast or fuel oil will be carried in peak tanks and alternately with oil in double bottom.

Reserve feed water and fresh water for domestic purposes will be carried in the double bottom under the machinery space. Drinking water will be carried in separate fresh water tanks in the bridgehouse.

There will be four large cargo hatches through the upper and second decks and one small cargo hatch through upper and bridge decks. Wide spaced hold and 'tween deck pillars will be fitted, arranged so as not to interfere with the rapid stowage and discharging of cargo. Cargo will be handled through the four main hatches by a pair of 5-ton cargo booms of sufficient length to give a liberal outreach beyond the ship's side. For handling cargo through the small hatch, a derrick post with one 3-ton boom will be fitted on each side. The winches for the main cargo hatches will be placed on the upper deck. The winches at the derrick posts will be placed on the bridge deck.

Accommodations for the officers will be located in steel deck house amidships. The crew will be berthed in the poop, and a separate messroom will be provided for their use.

Propelling machinery will consist of a Vertical Triple Expansion Marine Engine, size 24½"x41½"x72" diameter by 48" stroke of the Llewellyn Iron Works manufacture and in accordance with the maker's plans and specifications therefor. There will be three Scotch Marine Boilers. Necessary engine and fire room auxiliaries will be supplied as specified later in detail. Electric lights will be fitted throughout, and the necessary steam driven electric generators will be supplied. The steam steering gear will be fitted with telemotor control and auxiliary steering gear will be supplied.

4. CLASSIFICATION.

The vessel will be built under the survey of Lloyd's Register of Shipping to Class 100-A-1. Classification Certificates, including certificates for anchors and chains, will be supplied to the Owners.

5. MATERIAL AND WORKMANSHIP.

All material used in the construction of this vessel will be of good commercial grade. All plates, shapes and rivets will be in accordance with Lloyd's requirements. Blacksmith work will be strong and substantial, reasonably smooth, and galvanized where specified. Timber will be of good merchantable quality Douglas fir, unless otherwise specified, reasonably free from sap, shakes, large knots, and other defects.

All workmanship will be in accordance with good merchant practice, and no work detrimental to strength or water-tightness will be permitted.

6. SCANTLINGS.

It is not intended to specify in detail all scantlings for plates and shapes as same will be in accordance with the midship section approved by Lloyd's. Where necessary, substitution will be made in scantlings to facilitate getting material.

7. TESTING OF COMPARTMENTS.

All compartments of double bottom and peaks will be tested to a head of water in accordance with Lloyd's requirements. Steel decks, wood decks, bulkheads, chain lockers, etc., will be tested as required by Lloyd's Surveyor.

8. STEEL CONSTRUCTION.

The vessel will be built entirely on the transverse framing system and in full conformity with all the requirements of Lloyd's rules.

9. STEM.

The stem will be fitted in two lengths, joined by a scarph just above the turn of the fore foot. The upper part will be of rolled steel bar or wrought steel at option

of builders. The lower part will be of cast steel or wrought steel shaped to suit the form of the ship forward and properly connected to the flat plate keel. Rivet holes in the stem will be drilled.

10. STERN FRAME.

The stern frame will be of cast steel fitted in two sections, with scarphs at upper part of rudder post and lower part of propeller post. Part of frame joining lower part of propeller and rudder posts will be oval in section and increased in area as required by Lloyd's rules.

11. RUDDER.

The rudder will be of single plate type, the frame being of forged steel with arms keyed to stock in way of pintles. The stock to be made in two pieces with vertical coupling below counter.

Pintles to be of steel, to fit gudgeons with taper and secured by nut and check pin, upper pintle to serve as a woodstop.

Rudder gudgeons to be filled with hard babbit.

Rudder trunk to be built of steel plate and angles and made water-tight.

Rudder carrier to be made of cast iron fitted with a flanged brass bearing.

12. THE KEEL, ETC.—SHAFT TUNNEL.

The Keel, Double Bottom, Frames, Floor, Longitudinals, Margin Plate, Tank Top Plating, Web Frames, Stringers, Deck Beams, Deck Plating, Shell Plating, Shaft Tunnel, Bulkhead, Breast Hooks, Panting Beams, Engine and Thrust Seatings, Casings and other structural features shall conform with the general plans and details as now approved by Lloyd's.

A portable plate will be fitted in the top of the shaft

tunnel under the after cargo hatch and secured by bolts. Proper facilities will be fitted for handling shaft.

13. PILLARS AND GIRDLES.

There will be two rows of wide-spaced pillars built up of structural shapes or round sections. Pillars will be located back from the corners of the hatches with a view to interfering with the stowage and discharging of cargo as little as possible. Over the line of pillars a girder, built up of structural shapes, will be run as far forward and aft as necessary, connected where practicable to the machinery casings. Doubling plates will be fitted on the tank top under pillars.

Outside the holds, and 'tween deck cargo spaces, the beam stanchions will be solid or of extra heavy iron pipe with forged heads and feet. They will, in general, be fitted to alternate beams with the necessary angle or channel headers. Special pillars will be fitted in the engine room in way of the engine casings.

The decks under winches, windlass, steering engine and other deck machinery, will be supported by girders and stanchions where essential.

14. CHAIN LOCKER.

The chain locker will be located forward of the collision bulkhead on the watertight flat and will be constructed of steel. It will be fitted with a center division and provided with necessary pad eyes, rings, and shackles for securing chain cable. A manhole for access from the upper deck will be provided. Chain locker to be pumped out by hand pump located on upper deck.

15. TUNNEL ESCAPE.

At the tunnel recess, an escape trunk will be built, leading to the poop deck. An iron ladder or grabs will be fitted inside of trunk and there will be an escape door

in the poop. Steam or other pipes may be carried in this trunk if desired.

16. FRESH WATER TANK.

Fresh water for culinary use will be carried in separate fresh water tanks located in the after end of the bridge. Total capacity of these tanks will be about 7000 gallons. They will be provided with necessary drain cocks, pipe connections, manholes and ladders. They will receive two coats of cement wash inside. [redacted]

17. WATERTIGHT DOORS.

A cast iron vertical sliding watertight door will be fitted in the thrust recess bulkhead, operated by a vertical screw arrangement and gearing from the upper engine room platform. Watertight doors about 5'x4'6" will be fitted port and starboard in 'tween deck Bulkhead No. 73 and in forward bridge bulkhead. Tonnage opening 4' wide will be fitted port and starboard in after bridge bulkhead. Watertight doors about 5'x24", fitted in the poop end bulkhead. Weather tight doors will be fitted to the forecastle end bulkhead. The hinged watertight doors will be constructed of steel plate, strongly stiffened and fitted with necessary hinges, dogs, clamps, bolts, rubber packing, etc., as required.

18. HATCHES.

There will be five (5) main cargo hatches through the upper and second decks. All hatches will be of size and locations as shown on the Arrangement Plans. Coamings of all hatches on the weather deck will stand 36 inches above the steel deck at side. Coamings in bridge space shall be 10 inches high. On second deck, the coamings will consist of a heavy angle riveted to the steel deck and set back about 3 inches from the edge of the openings to

form a landing for the hatch covers. Fit pad eyes on each pillar at 'tween deck hatches to take life line. The bottom edge of coamings will either be flanged or fitted with a half round to prevent chafing of lines. All necessary wedge cleats, tarpaulin bars, wedges and straps together with lifting bolts and necessary fittings for securing the hatch covers will be provided. No wedge cleats or side bars will be supplied for hatches at the second deck.

19. DECK HOUSES.

The deck houses will be built of steel, with the exception of the wheel house, which will be of wood.

20. NON-WATERTIGHT METAL DOORS.

Non-water tight metal doors will be fitted in the engine, and boiler casings, lamp room, paint room, galley, crews' wash rooms and elsewhere as required. They will be constructed of steel plate stiffened by flat bar frames and fitted with hinges with brass pins and plain but rugged latches or locks as required.

21. MASTS.

There will be two masts built of steel, of suitable size. weight of plating and stiffening sufficient for handling cargo. Ladder rungs or vertical ladders may be fitted on both the fore and main masts in lieu of ratlines. The topmasts will be of wood, fited with a ball truck at upper end. Masts will be stepped where shown on the Arrangement Plans.

22. DERRICK POSTS.

There will be two derrick posts built of steel fitted at top as ventilators. The diameter, weight of plating and stiffening will be suitable for their height and load handled. Derrick posts will be stepped on the upper deck, and fitted with watertight angle collar riveted to the bridge deck. Side stays set up with turnbuckles will be

fitted to each post. Iron rungs or a vertical iron ladder will be fitted on each post.

23. ENGINE ROOM SKYLIGHT.

The engine room skylight will be of steel plate properly supported and stiffened by angle bars of suitable scantlings. It will be approximately 14 feet long by 10 feet wide pitched at a suitable angle. Skylight to be of portable bolted type.

24. RIVETING.

All riveting will be in accordance with Lloyd's Rules in regard to material, size, spacing and quality of workmanship. Countersunk rivets will be finished with convex points. All overlap butt connections will have complete rows of rivets. Shell rivets will be finished full, standing a trifle above surface of plate.

25. DOUBLE BOTTOM.

A double bottom will be fitted complete from forward to after peak bulkheads, constructed on the cellular system. The center line keel will be oil tight in way of the fuel oil tanks and water tight in way of the reserve feed water tanks. The double bottom will be divided by oil tight or water tight floors and center line keel into twelve (12) compartments. All tanks to be tested. Cofferdams will be installed between freshwater and fuel oil compartments.

26. SETTLING TANKS.

A settling tank, of size shown on plans, will be built forward of boiler room bulkhead. It will be strongly constructed of plates and stiffened by angles as required by Lloyd's Rules, and provided with an oil tight center line division. Swash plates will be fitted as required. On the second deck, there will be 2 oil tight hatches for access to tank, fitted with bolted oil tight covers. All

necessary pipe connections will be provided. Tank sides in cargo space protected by wood framing. Cofferdam angle to be fitted around settling tank on tank top draining to bilge.

27. BILGE KEELS.

There will be bilge keels about 160 feet long, built up of structural shapes riveted to shell with two rows of rivets. Projecting edge of plate will be fitted with 2½-inch half round iron, riveted through plate.

28. BALLAST TANK.

Hold No. 3 will form ballast tank below second deck and will be divided by center line watertight bulkhead

Ballast tank to be fitted with necessary means for filling and discharging.

28-A. DRAWINGS AND PLANS.

The Builders will supply the Owners with blue prints of the general arrangement of the vessel; also of the capacity plan, midship section, deadweight scale and pumping arrangement. A copy of the three latter plans to be framed under glass and put aboard the vessel.

CARPENTER WORK

29. HOLD CEILING.

The cargo holds will be ceiled with 2½-inch S2E and 1S fir laid on runners to give a 2-inch air space between the ceiling and the tank top. Ceiling will be fitted over the limbers to the upper turn of the bilge. All ceiling will be put down in portable sections.

30. CARGO BATTENS.

Cargo battens of fir, 6x2 inches S4S spaced about 9 inches apart will be fitted in the hold, the 'tween decks and the bridge. They will be secured to frames by portable batten cleats or riveted wrought steel cleats at the option of the builders.

31. WOOD DECKS.

The top of the deck houses in way of living quarters and the navigating bridge will be covered with 2½-inch fir decking S4S caulked with oakum and payed with a standard seam composition.

32. HATCH COVERS.

Hatch covers will be of fir, about 3 inches thick, beveled on ends of grain, S4S, made in portable sections and fitted with lifting bars, fitted at opposite corners. The hatch covers will be arranged to be laid fore and aft, set on hatch girders, and will be of a size suitable for convenient handling.

33. WOODEN GRATINGS.

Suitable wooden gratings will be fitted in the chain lockers and store rooms, dynamo room, chart house, and over rudder stock on poop for stowing hawsers.

34. SHELVES AND BINS.

Necessary shelves and bins of wood for boatswain, carpenter and steward's stores will be built as is customary.

35. WOODEN BEDS.

Suitable fir beds will be fitted under the windlass.

Cargo winches will rest either on steel winch foundations or hardwood shims, placed on steel winch foundations, securely bolted.

JOINER WORK

36. GENERAL DESCRIPTION AND MATERIAL.

The general arrangement of the living quarters will be as shown on the arrangement plans. Slight alterations may be made in this arrangement if found to be desirable when developing detail plans of these spaces. All joiner work will be of fir or hardwood where specified, and will be neatly joined and efficiently fastened. Hardware throughout will be of composition of good quality.

37. WHEEL AND CHART HOUSE.

This house will be of size and shape shown on the arrangement plans. The sill will be of 5x7-inch fir, and the plate of 5x3-inch fir, with studding of 3x3-inch fir, spaced to suit the doors and windows. Tie rods will be of ⅝-inch brass bar, hove up under the tie plates with nuts. Carlins will be of 3x2½-inch fir, spaced about 20 inches apart. The top will be of ⅞-inch T. and G. fir covered with canvas. The outside finish of the house will be of fir with sunken panels or staving with neat mouldings. Outside doors and window sashes will be of teak. An ash vertical ladder with brass pipe hand rail will be fitted for access to the top of the house.

38. NAVIGATING BRIDGE.

The navigating bridge will be enclosed across forward and after ends and outboard side by a solid wooden bulwark, about 3 feet 6 inches high. A rail 5x2½ inches of planed fir with rounded corners will be fitted on top of bulwark. The bulwark will be built up of chamfered fir T. and G. staving about ⅝-inch thick, supported by substantial wooden stanchions, mortised into the sill plate.

39. INSIDE CEILING AND DIVISION BULKHEADS.

The interior of the deck houses and poop in all living quarters in way of steel work will be ceiled with 5/8-inch T. and G. fir with chamfered edges, except as provided in Article 43 and except in way of tie plates, etc.

Fore and aft athwartship division bulkheads will be of single thickness 1⅛-inch T. and G. fir with chamfered edges and secured in suitable head and sill runners.

40. OUTSIDE DOORS.

All outside doors in living quarters will be of teak with solid flush panels, and fitted with brass hinges. Door sills will be about 12 inches above the deck and fitted with brass sill plates.

41. OFFICERS' SALOON.

The officers' saloon will be finished in oak or "Upson" board with oak doors and air port trim. The furniture will consist of an upholstered back and seat settee, a dining table, a sideboard, and swivel chairs, all of oak. The deck head will be ceiled and painted white.

42. CAPTAIN'S AND CHIEF ENGINEER'S STATEROOMS.

The Captain's and Chief Engineer's staterooms will be finished in fir, painted white, with oak trim, and with all built-in and portable furniture of hardwood. The Captain's quarters will contain an upholstered back and seat settee, a desk, one (1) large swivel library chair, one (1) easy chair, and one (1) ordinary chair, one (1) small table, a built-in berth 3 feet 3 inches wide, with drawers under, a built-in wardrobe with hooks for hanging up clothes, and a bookcase or cabinet with glass doors. Suitable curtains, hung on brass rods, will be fitted across the front of the berth. Curtains will also be hung at the air ports. The Chief Engineer's room will be fitted up

similar to Captain's, except that no table or easy chair will be supplied, and furniture will be less expensive. All such furniture to be of oak.

43. OFFICERS' STATEROOMS.

Each Officer's stateroom will be furnished with a built-in berth 2 feet 6 inches wide, fitted with drawers under, a built-in wardrobe, an upholstered seat settee, a chair and a camp stool. All furniture will be of oak. The inside woodwork will be painted white. Deckhead to be cork painted.

44. CREW'S QUARTERS.

Metal berths will be fitted in the crew's quarters, including oilers, watertenders, cooks and messboys' quarters. All interior woodwork will be fir, painted white or other approved color.

45. LAMP AND PAINT ROOMS.

The lamp room will be located in the after corner of the forecastle. It will be fitted with the necessary oil tanks, hooks and racks for oil lamps, and a metal shelf for use in trimming and filling lamps. A steam smothering pipe will lead to this room. All fittings will be of metal.

The paint room will be in the forecastle. It will be fitted up with bins and racks for the storage of paint and oil cans and drums.

46. STEWARD'S STORE ROOM.

The steward's store room will be fitted with customary bins, lockers and shelves to stow the steward's stores.

HULL FITTINGS

47. AIR PORTS AND FIXED LIGHTS.

Air ports will be fitted where shown on the Arrangement plans. In the forecastle and poop, they will be 10 inches in diameter, fitted with dead covers. In the deck houses, they will be 12 inches diameter without storm shutters.

The air port frames will be of brass, riveted or bolted to the plating. All air ports will be fitted with suitable thickness of glass and will be provided with necessary tightening arrangement, consisting of tumbler bolts and handle screw nuts, fitted so they cannot be backed off. The surface of air ports, including frames and locking screws, will be rough finished and painted. Wind scoops for air ports will be provided for all living quarters and for a portion of the air ports in galley, pantry and mess rooms.

Fixed lights, about 10-inch diameter, with brass frames and a suitable thickness of glass, will be fitted in outside doors as may be required, and where necessary in light trunks and casings.

48. RAILS AND STANCHIONS.

Pipe railing will be fitted around the poop, bridge, forecastle and boat decks, of suitable height and fitted with three pipe rails. The upper rail will be of 1-inch galvanized iron pipe and the intermediate rail will be of ¾-inch galvanized iron pipe. Solid forged iron or cast steel stanchions will be fitted to take these rails, spaced about 4 feet apart. Solid bulwarks will be installed along upper deck, as shown on plans.

Portable sections will be provided in way of the ac-

commodation ladder, gangways and leadsman's platform; also in way of cargo hatch on bridge deck.

49. AWNING STANCHION AND RIDGE BARS.

Steel or pipe awning stanchions with wooden spreaders will be fitted in way of bridge and over poop deck. Wooden ridge poles supported by pipe stanchions will be fitted where necessary to properly support the awnings. Awning ridge ropes will be of galvanized wire rope set up with turnbuckles.

50. LADDERS.

Ladders with iron side bars and square bar or checkered cast iron or steel plate treads and galvanized iron pipe hand rails will be provided for access to poop, bridge and forecastle head. These ladders will be vertical where interference with the stowage of deck cargoes is to be avoided.

An iron ladder will be fitted to the smokestack. Ladders into holds will be of metal.

51. ACCOMMODATION LADDER.

There will be one accommodation ladder built in halves, arranged to ship on either port or starboard side. The ladder and platform will be of oak and all fittings will be galvanized. The necessary davits, steps, tackle and gear for handling and stowing this ladder will be provided.

52. BITTS, CHOCKS AND CLEATS.

Mooring bitts, chocks and cleats will be of cast iron. Mooring bitts will be on wood bed; chocks and cleats on steel. There will be four (4) heavy roller chocks and four (4) large closed chocks. There will be sixteen (16) mooring bitts and eight (8) mooring pipes.

53. HAWSE PIPES.

Cast iron hawse pipes, suitable for stockless anchors, will be fitted. They will be of heavy section and of proper size to stow the anchors. The lower side will be increased in thickness to allow for wear. The flanges to the shell will be riveted over a doubling plate and caulked watertight. An angle iron collar will be fitted, riveted and caulked to forecastle deck plating. Steel plate deck covers will be provided.

54. CARGO BOOMS.

There will be eight (8) fir cargo booms at main hatches about 52 feet long and of suitable diameter for handling a load of five (5) tons. At No. 3 hatch the booms will be approximately 32 feet long and designed for a load of three (3) tons. All fittings will be of steel finished black. Cargo and topping lift falls will be of plow steel wire rope.

There will be provided one (1) steel boom designed to lift 30 tons, with a margin of safety, stepped on deck aft of foremast, boom to be fitted with a cast steel or wrought steel gooseneck and heavy bands and pad eyes, etc., as necessary for taking tackle and cargo gear, cargo and topping lifts, falls of plow steel wire rope of suitable size to be fitted.

All blocks to be of metal of suitable size, and fitted with metalline bushings. Suitable gear will be provided for stowing boom in place.

55. CHAIN PIPES.

They will be of steel, about 12 inches diameter, leading into chain lockers.

56. BOOM RESTS.

Provision will be made for stowing all booms, and the necessary rests, toggle pins, etc., will be fitted.

57. VENTILATORS.

Natural ventilation by means of metal ventilators and cowls will be provided. They will be of suitable size and weight of material, and located for the efficient ventilation of cargo holds, 'tween decks, crew spaces, etc., as shown on plan. All ventilators will extend to the upper deck and be fitted with cowls or mushroom tops. Hold and 'tween deck ventilators will terminate at proper height above deck. Crew's quarters ventilators will, in general, be of cast iron of the swan neck type.

Stokehold ventilators will be arranged to turn from stokehold floor; engine room ventilators arranged to turn from upper engine room platform.

58. RIGGING, BLOCKS AND GEAR.

The standing rigging will be of galvanized steel wire rope, consisting of four (4) main shrouds on each side of each mast and one ¾" topmast stay on foremast and one stay from foremast to funnel for signal halyards. No other fore or back stays.

Shrouds will be set up at lower end with wrought iron pipe turnbuckles of suitable size, fitted with solid rigging hearts. Ratlines will be omitted if iron ladders are fitted up the masts. All connection of wire rope will be made either with standard thimbles and splices or with standard wire rope sockets.

All blocks for running rigging will be of metal and will be in accordance with list and rigging plans. The necessary blocks and rigging for halyards, cargo vangs and hoists will be provided.

Smokestack guys will be of galvanized steel wire rope.

All running rigging for hoists and topping lifts will be of plow steel wire rope. Manila rope whips will be fitted at lower ends of topping lifts and cargo vangs.

59. BOAT DAVITS AND SKIDS.

Boat davits will be mechanical or of the ordinary swinging type. They will be circular in section, made of wrought steel, and of sufficient height and outreach to properly stow and launch the life boats and the work boat. They will be fitted complete with necessary sockets, bands, guys, cleats, blocks and tackle. The boats will rest in wooden chocks, hinged on the outboard side.

Skid beams, built out from the deck houses, will be fitted for supporting the life boats and work boat. Deck of 2½-inch fir decking S4S caulked with oakum and payed with a standard seam composition as a continuation of the bridge deck decking will be fitted under the boats.

PAINTING AND CEMENTING

60. PAINTING.

All black steel work will receive one (1) coat of red "Eureka" paint or equal, and all surfaces exposed to view will be given two (2) additional coats of lead paint. The outside of the hull below the boot topping will receive one (1) coat of anti-corrosive and one (1) coat of anti-fouling paint supplied just before the launching of the vessel. All hardwood exposed to the weather will be given three (3) coats of varnish. Deck machinery will be given one (1) coat of oil paint of a selected color. The smoke stack will be given one (1) coat of red lead and one (1) coat of stack paint. Inside woodwork will, in general, be given (2) coats of white lead and one (1) coat of flat or gloss white as desired. All interior hardwood will be given a natural finish, stained as desired and varnished.

61. CEMENTING AND TILING.

Inaccessible pockets in the peaks, and in way of stringer bars, will be filled in with a mixture of coke and cement. Outer ways in the bilges, and elsewhere as may be required for drainage, will be covered with a mixture of Portland cement and sand and sloped to suit. The interior of the reserve feed water tanks will be coated with a cement wash.

Tank top in holds shall be given a brush coat of native tar with cement sprinkling.

Tank top in way of boilers to be coated with approved bitumastic solution and composition.

Inside of chain locker, pump wells, bulkheads, side of ship and deck head in way of refrigerator space and bilges to the height of tank wing brackets will be coated

with one coat of bitumastic solution and one coat of enamel.

The galley floor will be of brick tile. The Officers' pantry and bath room floors will be glazed tile. Steel decks in the officers' and crew's quarters will be covered with plastic or cement covered with linoleum. This deck covering will be laid about ¾ inch thick, and will have a smooth top surface.

EQUIPMENT AND OUTFIT

62. ANCHORS, CABLE, HAWSERS AND WARPS.

The anchors, chain cables, hawsers and warps will be as required by Lloyd's. They will be as follows:

2 Bower Anchors, Stockless.
1 Bower Anchor, Stockless.
1 Stream Anchor, Stockless.
1 Kedge Anchor, Stockless.

All anchors will be of Baldt or other standard make.

The chain cable will be furnished in 15 fathom shots, complete with shackles and pins.

Steam and towline will be of galvanized steel wire rope, stowed on metal reels.

Hawsers and warps will be of good quality manila rope.

63. LIFE BOATS.

There will be four 24-foot metallic life boats of standard make, also one wood-working boat about 16 ft. long, fitted with all necessary blocks, falls and tackle complete and with all the following equipment:

4 canvas covers for 24-ft. boats.
1 canvas cover for 16-ft. boat.
4 ridge poles for 24-ft. boats.
1 ridge pole for 16-ft. boat.
4 masts, yards and sails for 24-ft. boats.
4 manila painters, 60 ft. long.
24 ash oars, 12 ft.
4 ash oars, 10 ft.
4 boat hooks and poles.
8 hand axes.

4 galv. iron buckets with lanyards.
4 bailers.
4 boat lanterns ready for use.
4 cans containing 1 gal. each of oil.
4 boxes matches.
8 enameled drinking cups.
4 canvas bags containing marline, twine, etc.
4 watertight cases containing red lights.
4 sea anchors.
4 steering oars.
4 gallon vessels of storm oil.
4 water casks.
4 provision receptacles.
192 lbs. hard bread.
32 rowlocks attached by chains.
4 compasses, boxed.

64. SHIP'S BELL.

There will be furnished two composition ship's bells; one 12 inches in diameter, located on the forecastle head and swung in a suitable belfry, the other about 6 inches in diameter, fitted in front of wheel house, both polished and engraved with ship's name and date.

65. NAVIGATION OUTFIT.

1 Liquid compass, 8″ card, with brass stand, in wheel house.

1 Standard compass, 9″ card, supplied and placed on top of pilot house.

1 Liquid compass, 8″ card, with brass stand, on poop.

1 Mechanical fog horn.

1 Deep sea lead with 100 fathoms marked line.

1 20-lb. lead.

1 Cherub log and line.

2 Black signal balls.

1 Aneroid barometer.

1 Telescope.
1 Pair standard binoculars.
1 30″ megaphone.
2 Thermometers, copper-cased.
1 8-day striking clock for chart-room.
1 8-day clock for engine room.
1 Log-slate and pencil.
1 Set International Code of Signals.
1 Ensign.
1 Burgee.
1 House Flag.
1 Quarantine Flag.
1 Jack.

66. LAMPS.

The following lamps will be supplied by the builder and placed in position:

1 Mast head lamp.
1 Range light.
2 Anchor lights.
1 Set of side lights, port and starboard.
3 Binnacle lights.
2 Ruby signal lights.
1 Stern light.

All the above lamps to be of brass, standard size and fitted for either electric or oil light.

67. GALLEY, PANTRY AND STEWARD'S OUTFIT.

The galley will be supplied with one (1) wrought steel ship's range of standard make, containing one fire box and two ovens, and fitted complete with portable guard rails, mounted on 6-inch iron stanchions with cross bars. The range will be mounted on heavy marine type legs.

The galley will also contain one (1) 30-gallon extra heavy boiler, one (1) 2-compartment vegetable steamer, heavy wrought steel pan racks, dressers, sink and utensil

racks as are usually fitted in a cargo steamer. The galley will contain sufficient equipment to cook for a crew of 50 men.

The officers' pantry will contain one (1) combination steam table and plate warmer, which will be fitted with two meat plates and four (4) square boot legs tinned inside. The plate warmer will be constructed of heavy galvanized iron and the interior will be divided into suitable compartments and fitted with ¾-inch steam coils. There will also be one (1) battery of nickel plated coffee and hot water urns. In addition, all necessary dish racks, dressers, sinks, cup hooks, etc., will be provided.

The crew's pantry will contain a coffee and hot water urn, dressers, dish racks, sinks and cup hooks as required. A steam table will also be supplied.

Linen and bedding, dishes, glassware, tableware, crockery, cutlery, pantry and galley equipment will be furnished as detailed in Par. 133.

68. CANVAS COVERS AND AWNINGS.

A canvas cover for each boat, steering wheel, searchlight, telegraph, standard and after steering compasses and three (3) No. 2 Canvas Covers for each hatch will be supplied, one of which will be waterproof.

A canvas awning will be fitted over the poop deck aft and over the bridge. A canvas visor supported on a brass pipe frame will be fitted across the front of the wheel house.

69. BOATSWAIN'S AND CARPENTER'S STORES.

The following boatswain's and carpenter's stores will be supplied:

4 2″ mooring shackles, galv.
12 Galv. connecting shackles, ¾″, ⅞″, 1″.
12 Galv. spare shackle pins, ¾″, ⅞″, 1″.

8 1″ chain hooks.
6 brass padlocks.
1 stencil of ship's name.
6 deck brooms.
6 scrubbing brushes.
6 8″ wire brushes.
8 5″ triangular scrapers.
2 serving mallets.
2 serving boards.
24 paint brushes, assorted.
2 marline spikes, 12″ manila.
2 marline spikes, 16″ wire rope.
4 mops with handles.
6 22″ cork fenders with lanyards.
6 steel file scrapers.
2 sounding rods with lanyards.
1 packet needles (2 doz. assorted).
2 water cans, galv.
4 sewing palms.
1 rope ladder to reach light load line.
6 paint pots, 8″x8″.
6 paint pots, 6″x6″.
10 lbs. 7-ply cotton twine.
10 lbs. 8-ply cotton twine.
25 lbs. hemp spun yarn.
25 lbs. marline.
1 20″ dia. mounted grindstone.
4 caulking tools for steel.
1 set caulking irons for wood.
1 caulking mallet.
4 wood chisels, ½″, 1″, 1½″, 2″.
1 set bits, ¼″ to 1″, 13 sizes.
1 10″ brace.
1 24″ square.
1 26″ hand saw.
1 28″ rip saw.
1 1¼″ auger.

1 axe.
1 adze.
1 mallet.
1 nail hammer.
2 screw drivers, 4″ and 6″.
1 15″ jack plane.
2 ''No Admittance'' boards.
1 set of hatch wedges and bars (spares).
2 ''No Smoking'' boards.

70. Whenever these specifications specifically itemize equipment, navigating instruments, or spares, no other articles desired or required for going to sea shall be furnished by the Builder, except those herein specified, unless the same shall be ordered as extra, in writing, by Owner.

However, it is understood that all necessary equipment, navigating instruments and spares will be furnished to comply with the requirements of the U. S. Steamboat Inspection Service and the Classification Society.

Where Classification Society's Rules or the foregoing specifications allow choice between two or more materials or between two or more methods, this choice shall remain with the Builder.

HULL ENGINEERING

71. WINDLASS.

There will be a spur-geared steam windlass of the horizontal type located on the forecastle head. It will be fitted with two (2) wild cats and two (2) large warping ends. The windlass will be set on a fir bed 4 inches thick, fitted with a bounding angle riveted to the steel deck. Fore and afters will be fitted between the beams to take the holding down bolts. Doubling plates will be fitted under the windlass bed.

72. WINCHES.

There will be eight (8) horizontal geared reversible single gipsy reversing valve type steam winches located at the masts and two (2) with double gypsies on the bridge at the derrick posts. The steam cylinders will be about 9x10 inches and the drum duty will be at least about 5,000 lbs. on a single ship. All winches will be set on suitable channel or angle plate foundations. Winch cross head slippers will be babbitted.

73. STEAM AND HAND STEERING GEAR.

The steam steering gear will be located aft in the poop and direct connected to the rudder head. It will be controlled from the wheel house by means of a telemotor, operated by a wooden hand wheel mounted on the telemotor standard in the wheel house.

A cast steel tiller with necessary tackle and lead blocks will be fitted on the poop deck.

74. WARPING WINCH.

A suitable warping steam winch operated by a two-cylinder engine, 9"x10", will be located on the poop deck. Steam and exhaust connections will be taken from the steering engine line and deck lines.

75. WATER BALLAST AND DRAINAGE SYSTEMS.

The water ballast and drainage systems will be as approved by Lloyd's. The ballast system piping will be of galvanized iron connected with black iron ells at bends. The piping for the engine and fire room and cargo hold bilges will also be of galvanized iron connected as described for the ballast system. Connections to the bilge and ballast pumps will be through special manifolds located in the engine room, boiler room, and shaft tunnel.

The peak tanks will be connected to the ballast system and arranged so that these tanks can be filled or emptied when the vessel is light.

76. SANITARY SYSTEM.

The sanitary system will be maintained by a sanitary pump and will be direct flushing. All closets and urinals will drain overboard through soil pipes. Soil pipes to be properly protected. Piping for the sanitary system will be of galvanized iron. Strainers will be fitted to the suction side of the sanitary pump. Soil pipes will be connected at the ship's side to cast iron valves, fitted with clapper valves, and clean-out plugs. Baths and showers will have sea water and steam connections.

77. FIRE MAIN AND WASH DECK PIPES.

Fire main and wash deck pipes will be of galvanized iron of suitable size, and fitted at intervals with brass fire hose connections. Canvas hose of sufficient length to reach all parts of the vessel's decks and fitted with brass couplings will be provided. The fire main will be carried fore and aft on the upper deck, with extension to poop deck, and up the fire room casing amidships with suitable branches.

78. SMOTHERING PIPES.

Smothering pipes fitted in accordance with U. S. requirements will be led to the cargo spaces.

79. FRESH WATER SYSTEM.

The fresh water system will be maintained by a fresh water pump located in the engine room. This pump will be used to fill the gravity tank on top of the deck house. Hand pumps, drawing from the gravity tank, will be fitted in the galley and pantries. All piping will be of galvanized iron. Wash basins, sinks, etc., will have all drains lead overboard at ship's side through cast iron valves. There will be fresh water connections to the bath tubs and wash basins in bath rooms. Wash basins in staterooms will be of the receiver and waste tank type.

80. STEAM HEATING SYSTEM.

All living quarters, mess rooms, toilets, bath and wash rooms and wheel house will be heated by steam radiators. The pipes and coils will be of black wrought iron, except in the wheel house, where they will be of brass. Joints will be made with unions. Radiators, in general, will be of the coil type and will be built up of 1-inch pipe with ½-inch steam and drain valves. At the option of the builders, cast iron radiators may be fitted in staterooms in place of coil radiators. The heating system will be arranged in circuits with control valves where required.

Sinks will be fitted with a steam coil to heat water. A suitable steam heater for obtaining hot water will be provided for the baths and showers, and for a hot water faucet in the wash rooms.

81. PLUMBING.

The plumbing will be of good quality and of a style suitable for the quarters in which it is located. Bath tubs will be of enameled iron 5 feet long and fitted with nickel plated brass fittings. Officers' water closets will be of enameled earthenware of the straight hopper, flush rim type, connected directly to the sanitary pump. Wash basins in the bath rooms will be of porcelain of the open

flushing type and fitted with water supply from the gravity tank. Bath rooms will be supplied with nickel plated towel racks, soap dishes, tumbler holders and one mirror in a hardwood frame.

The firemen's and sailors' wash rooms will each be fitted with an enameled iron wash stand with three basins fitted with hand pump connections to the fresh water gravity tank. One shower bath with hot and cold salt water supply will be fitted in each wash room. The firemen's quarters will be fitted with two (2) and the seamen's quarters with two (2) enameled iron straight hopper continuous flush water closets, and with one porcelain continuous flush urinal.

In each stateroom there will be provided one enameled iron lavatory with nickel plated chain and stopper, and fitted with a porcelain lined cast iron receiver with self-closing faucet and waste jar. A suitable toilet rack with mirror will be furnished with the lavatory. Each stateroom will also be provided with a nickel plated towel rack, soap dish and tumbler holder.

82. REFRIGERATION.

There will be supplied and installed a two-ton Johns-Manville refrigerating machine with properly insulated refrigerated space divided into two compartments and having a total capacity of about 1200 cu. ft.

ELECTRICAL OUTFIT AND INTERIOR COMMUNICATION

83. GENERATING SETS.

There will be two 15 K. W. direct current, marine type, generating sets of standard manufacture. They will be direct connected to reciprocating engines. Generators will be compound wound and of the multi-polar type. Each generator to have a capacity for 15 K. W. at 110 volts and must be capable of standing a change from no load to full load and vice versa, without injury and without sparking at the brushes.

84. SWITCHBOARD.

There will be one switchboard of standard manufacture located in the engine room. The switchboard will be of asbestos or of slate free from mineral conducting veins, and black enameled on the face and edges. It will have mounted on it the necessary switches for controlling the various lighting circuits, together with circuit breakers, rheostats, ammeters, and voltmeters as usually fitted.

85. DISTRIBUTION BOXES.

The distribution boxes will be of splash-proof construction, propertly fitted with double pole switches and cartridge fuses for each circuit.

86. CIRCUITS.

Circuits will be arranged for lighting living quarters, outside of deck houses, machinery and boiler spaces and wherever fixed lamps or outlets for portable lights are required. The cargo spaces will, in general, be lighted by means of cluster lights on cables.

87. WIRING.

Marine wire of good quality will be used throughout the vessel. The wires will be run in wooden mouldings through all living quarters. Below decks in cargo spaces and engine and fire rooms, the wire will be run in watertight pipe conduits. Where wires are concealed by panels, they will be run in flexible woven conduits. Wiring will be run on the double wire system and the drop in voltage to the farthest lamp, must not exceed 3½ volts. Pipe conduits, where lead through decks or bulkheads, will be made watertight with lock nuts. Where fixed lights are fitted in cargo spaces or where exposed to injury, they will be protected by heavy iron cages.

88. FIXTURES.

There will be provided outlets and fixtures in number to properly light the vessel. An electrical lighting plan, showing arrangements of circuits, outlets, etc., will be prepared and submitted for approval. In the engine room, fire room, shaft tunnel, and all spaces exposed to moisture, fixtures will be of the guarded watertight type.

There will be furnished and installed on top of wheel house one 18-inch electric search light of standard manufacture mounted on trunnions and fitted with wheel house control.

89. TELEPHONE SYSTEM.

An intercommunicating system of loud speaking telephones will be installed with an instrument in each of the following rooms:

1 captain's room.

1 chief engineer's room.

1 in wheel house.

1 in engine room.

1 in wireless room.

90. CALL BELLS.

Electrical call bells will be installed between the Captain's room and Steward's and Chief Officer's rooms.

Fire alarms and gongs will be installed as required by Lloyd's Rules.

PROPELLING MACHINERY.

91. GENERAL.

The propelling machinery will consist essentially of the following:

One reciprocating engine designed for 2800 I. H. P. at 85 R. P. M.; three Scotch marine boilers, each containing about 2900 square feet heating surface; main and auxiliary surface condensers, circulating and air pumps; main and auxiliary feed pumps; ballast pump, fire and bilge pumps, engine room bilge pump, fresh and salt water sanitary pumps; feed water heater, evaporation and distilling plant and fuel oil burning system.

92. LINE AND TAIL SHAFTING.

Line and tail shaft will be as required by Lloyd's. Tail shaft will be fitted with cast gunmetal sleeves for full length of the after bearing and of a length approved by Lloyd's on forward bearing. A steel nut will be fitted on end of tail shaft for securing propeller. An outside watertight guard fitted over propeller nut.

93. STERN TUBE AND BEARING.

Stern tube will be of cast iron provided with brass and lignumvitae lining at each end. A suitable stuffing box will be fitted on forward end of stern tube.

94. PROPELLER.

The propeller will be 4-bladed, right hand, true screw, about 17 feet 0 inches in diameter, with hub of cast iron and bronze blades. The hub will be bored accurately to fit the taper end of tail shaft, and secured by feather and nut.

Only one spare blade will be furnished.

95. STEADY BEARINGS.

Each section of line shaft will be supported by a cast iron steady bearing 14 inches long, lined with white metal, and fitted with wick feed oil boxes. Drip pockets and drains will be provided for catching oil.

96. MAIN CONDENSER.

Main condenser will be cylindrical in form, with steel shell and cast iron water chests. Cooling surface not less than 3650 square feet. Tube sheets will be of rolled brass 1 inch thick secured to chest and shell flanges by through bolts, a portion of which will be collar bolts.

Tubes will be of Admiralty Metal, or brass tube tinned in and out, ¾ inch outside diameter, No. 17 B. W. G. thick, fitted with screwed ferrules properly packed. Tubes will be supported at mid-length by a composition supporting plate secured to shell.

Tubes will be so arranged in the condenser as to provide easy access for the steam to all tubes.

Main exhaust from engine to condenser will be made of copper pipe of proper size.

Circulating connections will be about 15 inches in diameter, and arranged to suit conditions.

Condenser will be provided with all necessary hand holes, drains, soda cock, boiling-out nozzle, relief valve, etc.

97. MAIN CIRCULATING PUMP.

This pump will be of the centrifugal type, having cast iron casing and composition runner, driven by a direct-connected single cylinder engine.

Pump will have a maximum capacity of 7000 gallons per minute, when drawing from the sea and discharging through condenser and overboard.

98. MAIN AIR PUMPS.

An Edward's type air pump capable of maintaining a vacuum of at least 26 inches when condensing 40,000 lbs. of steam per hour will be attached to main engine, and discharge to filter tank.

99. FEED PUMPS.

Main and auxiliary feed pumps will be of the vertical simplex type, 10½ inches by 8 inches by 20 inches or equivalent capacity, brass fitted; or steam turbine-driven four-stage centrifugal.

Main feed pump will draw from the feed tank, and discharge to the boilers through feed water heater.

Auxiliary feed pump will draw from feed tank, sea, boilers, and reserve feed tanks, and discharge to the boilers, feed heater and overboard.

100. BALLAST PUMP.

Ballast pump will be horizontal duplex, 12 inches by 10 inches by 12 inches or equivalent capacity, brass fitted, for handling salt water and fuel oil.

This pump will draw from the sea, the double bottom and peak tanks, and discharge to double bottoms, peaks and overboard.

101. FIRE AND BILGE PUMP.

Pump will be horizontal duplex, 12 inches by 8½ inches by 12 inches, or equivalent capacity, brass fitted, for handling salt and bilge water.

Suction will be from the sea, the bilge manifolds and t
oilers, and discharge to fire main, conder
nd overboard.

102. ENGINE ROOM BILGE PUMP.

There will be one horizontal duplex pump about 6

inches by 5¼ inches by 6 inches, brass lined and fitted on water end, for clearing bilges in engine-room. A connection will also be made to the bilge main for draining holds.

Discharge from pump will lead overboard.

103. SANITARY PUMP.

One horizontal brass fitted duplex pump about 7½x5x6 inches will be supplied and connected for furnishing water to sanitary system, and circulating water to distiller. Suction will be from sea. This pump will also discharge to the fire main.

104. FRESH WATER PUMP.

Fresh water pump will be a duplicate of the sanitary pump, and will draw from fresh water tanks and reserve feed tanks, and discharge to the fresh water tanks and service tank on top of house.

105. AUXILIARY CONDENSING EQUIPMENT.

There will be one auxiliary surface condenser installed in the engine room, containing about 950 sq. ft. of cooling surface. Tubes will be ¾ inch outside diameter and 8 feet 6 inches long. Tube sheets will be of rolled brass, I inch thick; support plate of composition, fitted same as main condenser. Auxiliary exhaust connection will be at top of shell with perforated baffle plate under same to distribute exhaust steam.

A horizontal combined air and circulating brass fitted pump 10x12x12x12 inches will be installed under auxiliary condenser. Circulating end will draw from the sea, discharging to condenser and overboard. Air end to draw from condenser and discharge to filter tank.

Auxiliary condenser will be mounted on foundation in convenient location and arranged so as to be accessible for cleaning and withdrawing tubes.

106. FILTER AND FEED TANK.

A combined filter and feed tank will be provided containing about 90 cu. ft. It will be built of steel plate, 3/16 inch thick, and will contain an inlet compartment, three filter compartments, and a lower division for feed reservoir, containing feed pump connection and float arrangement for operating feed pump control valve.

A suitable cover will be provided for access to filter compartments.

106-A. FEED WATER HEATER.

There will be one feed water heater provided, having sufficient capacity to raise temperature of 45,000 lbs. of water per hour, 112 degrees Fahrenheit, using exhaust steam as heating agent.

Heater will be of the closed type, and placed in the discharge line between pumps and boilers. Tubes will be arranged so as to be easily accessible for cleaning. Drain from heater will be led to filter tank.

A suitable pressure regulator will be placed in auxiliary exhaust line to maintain the desired back pressure on heater.

107. INJECTOR.

There will be furnished and installed one 2-inch injector of Metropolitan Model T. or equal. Injector to have flanged connections with suction to reserve feed tanks, and discharge to auxiliary feed line.

108. EVAPORATING AND DISTILLING PLANT.

Evaporator will have a daily capacity of 25 net tons, and will be of the vertical marine type with cast shell and removable coils. Steam for heating will be taken from the auxiliary steam line. Vapor will be discharged to main condenser with a branch to distiller.

Evaporator feed pump will be attached to main engine with suction from the sea and from condenser overboard discharge.

Distiller will be of the vertical marine type with cast shell. Coils to be easily removable for cleaning. Circulating water will be supplied by the salt water sanitary pump. Drain from distiller will be led to fresh water tanks on upper deck.

109. MAIN BOILER.

There will be three single ended Scotch marine boilers, 15 feet 6 inches inside diameter and 11 feet long in steam space, built to conform to Lloyd's Rules and U. S. Steamboat Inspection for a working pressure of 210 lbs. per sq. inch. Heating surface in each boiler will be about 2900 sq. ft.

Each boiler will contain three corrugated furnaces, 47 inches inside diameter, and about 7 feet 4 inches long. Tubes to be 3 inches in diameter and 7 feet 4½ inches long.

There will be three combustion chambers, one for each furnace. Chambers will be 34 inches deep with crown sheets supported by steel plate crown bars.

Longitudinal seams of shell will be double butt-strapped and treble riveted; circumferential seams double riveted.

Each boiler will have a main stop valve on top of shell with pipe leading to header; duplex safety valves; main and auxiliary feed check and stop valves; surface and bottom blow valves; two water columns and steam guage.

110. BREECHING.

Boilers will be connected by suitable uptakes to one double stack, properly guyed and supported.

Breeching will be designed to have ample area at all

points and will be built double, enclosing an air space between inner and outer casings. Hinged doors will be fitted in way of tubes for cleaning.

111. STACKS.

Stack will be about 8 feet in diameter and a proper height above the base line and will be fitted with stiffeners, guy bands, etc.

112. GAUGE BOARD.

A suitable gauge board will be mounted in the lower engine room, containing all necessary steam and vacuum gauges, and an 8-day marine clock. Gauges and clock to be brass cased, and uniform in finish. A suitable revolution counter will be provided, and a recording steam gauge located in Chief Engineer's room.

113. SEA CHESTS.

All sea chests will be of heavy cast iron or steel secured to skin of ship. Strainer plates will be of galvanized steel with area through holes double that of pipe. Each sea chest will be provided with steam connection for blowing out.

114. LADDERS AND GRATING.

Ladders and gratings will be provided in engine and boiler rooms wherever necessary for convenient access to machinery.

Engine room ladders will have wrought iron sides and cast iron or checkered steel plate steps. Boiler room ladders to have square bar treads. Gratings will be made of $\frac{5}{8}$-inch square bars spaced $2\frac{1}{4}$-inch centers and riveted into side bars.

Engine and boiler room floor shall be of checkered floor plating.

Hand rails and stanchions will be fitted wherever necessary.

115. ENGINE ROOM TELEGRAPH.

Two double-face mechanical telegraphs will be mounted upon stand on the navigating bridge, connected with repeating telegraph in engine room at working platform. Necessary brass wire leads, sheaves, chains, etc., will be provided. Also telegraph from engine room to poop.

116. WATER SERVICE.

Water service will be provided for cooling thrust and steady bearings, and swivel joints fitted for directing the water where needed. Connection will also be made to the forward end of stern tube for clearing same of sand, etc.

Supply for water service will be taken from circulating pump discharge.

117. FUEL OIL SYSTEM.

A horizontal duplex piston pattern pump about 7½x 6x10 inches will be installed in the engine room, arranged to draw from the oil manifold and discharge to the settling tanks.

Oil service pumps will be horizontal duplex, 5¼x3½ x5 inches, in duplicate, mounted on trays in boiler room. Both pumps will be connected to draw from the high suction and from the bottom of tanks for removing water. Both pumps will discharge to heaters and burners, the low suction pump also discharging overboard.

The fuel oil system will be complete with suction and discharge strainers and heaters in duplicate, governor, air chamber, meter, and all piping and valves necessary for efficient operation.

Three burners will be fitted on each boiler. Two spare burners will be supplied.

118. PIPING.

There will be a main stop valve on each boiler, from which steam will be led to a header with stop valves in each branch. A separate line will have branches for auxiliary steam pipes, whistle pipes and connection for deck machinery.

Main steam pipes will be of wrought iron or steel, about 8 inches in diameter, leading from header to the main engine. Flanges will be of forged or cast steel.

Auxiliary steam pipe will be of wrought iron or steel with forged or cast steel flanges wherever subjected to full boiler pressure. It will lead from the header to engine room, and through reducing valves to engine room and boiler room auxiliaries. Feed pumps and injector will be supplied with steam at full boiler pressure. An independent line will be taken off close to the header for supplying steam to generators.

Deck machinery will be supplied by an independent line from header through suitable reducing valve.

A branch from main header or boiler direct will furnish steam to the whistle.

Auxiliary steam pipes on reduced pressure lines will be standard black iron lap welded pipe.

Auxiliary exhaust pipes will be of wrought iron or steel and will be led to main and auxiliary condensers, feed heater and to escape pipe, with controlling valve in each branch.

Feed pipes will be of seamless, drawn copper with brazing metal flanges and gunmetal fittings.

Air and circulating pump suction and discharge pipes, and sea suctions to ballast and bilge pumps will be of copper, with cast iron flanges and fittings.

Deck steam and exhaust pipes outside of bridge house will be of steel, with copper connections at winches.

119. VALVES AND MANIFOLDS.

All valves 2½ inches in diameter and under will be of composition.

Valves 3 inches in diameter and over will be of cast iron or steel with composition mountings.

All manifolds will be of cast iron with composition mountings.

120. MAGNESIA COVERING.

Boilers above saddles and back end of boilers, feed heater and evaporator will be covered with block magnesia or equivalent insulation. Steam and exhaust pipes where necessary will be covered with 85 per cent magnesia sectional covering, wrapped with canvas and sewn.

121. WHISTLE.

An 8-inch single bell chime whistle will be provided, and fitted with balanced valve with flanged connections. Whistle and pipe will be securely fastened to stack and properly covered; access to whistle by vertical ladder riveted to stack, with repair platform at whistle.

122. ENGINE AND BOILER ROOM TOOLS, ETC.

A suitable work bench fitted with drawers and a vise will be provided.

An outfit of tools, suitably stowed in racks in engine room, will be supplied as follows:

1 8″ Trimo wrench.
1 10″ Trimo wrench.
2 18″ Trimo wrenches.
1 48″ Trimo wrench.
1 10½″ adjustable tap wrench.
1 30″ adjustable tap wrench.
1 6″ Coes wrench.
1 8″ Coes wrench.

1 15″ Coes wrench.
1 21″ Coes wrench.
1 set dies, sizes ¼″ to 1½″—13 sizes.
1 set taper taps, sizes ¼″ to 1½″—13 sizes.
1 set plug taps, sizes ¼″ to 1½″—13 sizes.
1 set pipe taps, ¼″ to 2½″.
1 set pipe dies, adjustable, ¼″ to 3″, with stock.
6″ combination pipe and bench vise.
1 ½-ton Duplex chain tackle.
1 1-ton Duplex chain tackle.
1 5-ton Duplex chain tackle.
2 16-oz. ball pein hammers.
2 24-oz. ball pein hammers.
1 14-lb. sledge hammer with handle.
1 8-lb. sledge hammer with handle.
1 2-lb. ball pein hammer.
6 sledge hammer handles.
2 4½″ machinist's screw drivers.
2 6¼″ machinist's screw drivers.
1 12″ machinist's screw driver.
1 thread guage.
1 6″ Starrett outside caliper, lock joint.
1 6″ Starrett inside caliper, lock joint.
1 12″ Starrett outside caliper, lock joint.
1 12″ Starrett inside caliper, lock joint.
1 16″ Starrett outside caliper, lock joint.
1 16″ Starrett inside caliper, lock joint.
1 set machinist's scrapers.
1 6″ Starrett spring dividers.
1 set trammel points.
1 adjustable hack saw frame.
12 hack saw blades.

1 breast drill, double geared, ⅛" to ⅜" drills.
1 3 ft. steel straight edge.
1 16" Keystone ratchet for square shank drills.
1 valve reseating machine, medium.
1 set square taper shank drills, ⅜" to 1¼", 24 sizes.
1 set of 3 pieces packing tools.
1 pinch bar, 5' long.
6 cold chisels, 6" and 8".
6 cape chisels, 7".
2 diamond point chisels.
2 center punches, 4" and 6".
1 set steel stamps, ¼" figures and alphabet.
1 pair 8" side cutting pliers.
1 pair 12" tinner's shears.
1 6-lb. copper hammer, handled.
1 set drop forged single end wrenches, ½" to 1½".
1 8" mason's trowel.
1 8"x2"x1" combination carborundum oil stone.
1 20" mounted grindstone.
1 1-qt. kerosene blow torch with hook and support.
1 3-lb. soldering copper.
1 gauge glass cutter.
2 14" flat bastard files.
2 14" second cut files.
2 14" smooth flat files.
2 16" flat bastard files.
2 16" second cut files.
2 14" half round flat bastard files.
2 14" half round second cut files.
1 12" square bastard file.
1 12" square second cut file.
1 8" second cut file.

1 6″ second cut file.
2 14″ round bastard files.
1 doz. assorted file handles.
2 file cards.
1 steel plate portable forge with crank blower.
1 100-lb. anvil.
1 22″ straight lip tongs.
1 22″ bolt tongs.
1 2½-lb. hot chisel, handled.
1 2½-lb. cold chisel, handled.
1 3″ tube roller.
4 boilermaker's caulking tools.
1 26″ hand saw.
1 10″ ratchet brace.
1 set of 13 wood bitts, ¼″ to 1″.
1 extension bit.
1 nail hammer.
1 24″ square.
1 12″ iron jack plane.
1 14″ iron jack plane.
1 12″ combined square and level.
1 1-gal. copper measure.
2 1-qt. copper measures.
2 1-qt. copper oil fillers.
2 6″ copper funnels.
3 1-pt. brass oilers.
12 extra spouts for same.
12 welded steel oilers, ¾ pt.
12 extra spouts for some.
50 ft. 1″ steam hose.
6 3″ tube cleaners.
12 tube stoppers.

6 12″ coal shovels.
3 slicing bars.
3 ash hoes.
1 6″ babbitt ladle.
1 copper salinometer pot.
2 hydrometers.
2 12″ round second cut files.

123. SPARE PARTS.

In addition to spare parts already specified, the following will be furnished, properly stowed in racks:

6 coupling bolts for shafting.
1 set of feed pump valves.
1 set of bilge pump valves.
40 condenser tubes and 80 ferrules.
20 plain boiler tubes.
3 boiler stay tubes.

SUPPLEMENTAL SPECIFICATIONS FOR OIL BURNING VESSEL CONVERTIBLE TO COAL BURNING

124. **GENERAL.**

All features of an oil burning vessel as hereinbefore described will be constructed, including location and installation of any necessary valves for turning off or turning on fuel oil system; and vessel will be arranged and equipped as an oil burner, but equipment for converting to a coal burner will be provided as follows:

125. **HATCHES.**

Weather deck, saddle back and trimming hatches of the sizes and locations shown on plans.

126. **COAL BUNKERS.**

Coal bunkers will be located on second deck alongside machinery casings. Additional coal bunker space will be provided in bridge space as shown on plans approved by Owner. Coal bunker bulkheads, trunks and chutes will be substantially constructed and arranged as shown on plans. Steel coal bunker doors will be arranged to slide vertically in grooves at lower end of chutes in fire room.

127. **BOILER FRONTS.**

Boiler fronts for coaling will be provided.

128. **ASH HOIST.**

A steam hoist of vertical lift type will be installed in boiler room for discharging ashes overboard. An approved conveyor, which will permit of dumping ashes overboard on either side of ship, will be installed.

129. FIRE TOOLS.

A complete set of firing tools will be furnished and stowed in convenient location in boiler room.

130. FORCED DRAFT.

Howden's system of forced draft will be installed.

131. CEMENT IN DOUBLE BOTTOM.

It being the intention to carry fuel oil in the double bottom compartments, except under engine and boiler space, the cement required by the Classification Society in all double bottom compartments for coal burning vessels will be omitted in the compartments for carrying oil and Owner will secure permit from Classification Society for such omission, without prejudice to 100-A-1 certificate. The fresh water compartments will be cemented as required by Lloyd's Rules.

132. COAL GRATES.

Two full sets of coal grates will be furnished.

133. **HOTEL EQUIPMENT.**

The following hotel equipment will be furnished:

OFFICERS' AND ENGINEERS' MESS

Silverware.

48 tea spoons, community silver.
18 dessert spoons, community silver.
12 table spoons, community silver.
18 soup spoons, community silver.
18 egg spoons, community silver.
2 spoon holders.
36 dinner forks, community silver.
24 dinner knives, community silver.
24 dinner knives, steel, hard rubber handles.
1 carving set—3 pieces.
3 butter knives.
2 soup tureens and ladles—hotel silver—6 pt.
1 2 pt. tea pot.
1 4 pt. coffee pot.
4 12" N. P. bread trays.
4 gravy ladles.
2 ¾ pt. cream pitchers.
2 3 pt. milk pitchers.
2 16 oz. sugar bowls.
3 butter dishes with glass drain.
18 napkin rings, numbered 1 to 18 inc.
2 cruet stands—3 bottles.

Crockery and Glass.

24 coffee cups with handles and saucers—8½ oz.
24 dinner plates—rolled edge—9".
24 breakfast plates—rolled edge—8".
24 soup plates—rolled edge—9".
24 bread and butter plates—rolled edge—6".
24 oatmeal bowls—rolled edge—6".
24 pudding plates—rolled edge—5⅝".

4 12″ oval dishes—rolled edge.
4 14″ oval dishes—rolled edge.
8 covered deep vegetable dishes—12″.
4 gravy boats—8x3½″.
24 egg cups.
2 mustard jars and spoons.
4 water jugs.
36 10 oz. medium tumblers.
6 salt shakers.
6 pepper shakers.
6 6-oz. oil cruets.
1 large hand dinner bell.
2 toothpick holders.

2. CREW'S MESS.

Silverware.

36 bone handle—steel blade knives.
36 bone handle—steel tine forks.
72 Tinned steel tea spoons.
48 Tinned steel table spoons.

Crockery and Glassware.

36 coffee cups, double thick—tulip shape—13-oz. with saucers.
36 plates—double thick, 9½″.
36 fruit saucers—double thick, 5¼″.
36 soup bowls—double thick, 6″.
6 vegetable dishes, 12″.
8 oval platters—hotel thick, 15″.
4 mustard cups, with handles.
4 sugar bowls—16-oz. capacity, with covers.
4 3 pt. white enameled pitchers.
4 gravy boats—heavy.
36 heavy water tumblers—10-oz.
6 salt shakers.
6 pepper shakers.

4 earthenware butter pots.
6 vinegar cruets.

3. GALLEY EQUIPMENT.

1 single firing—7 ft. range.
1 30 gallon range boiler—extra heavy.
1 2 compartment vegetable steamer.
1 steam table and plate warmer in saloon pantry.
1 steam table for crew.
2 coffee urns—3 gallons.
2 hot water urns—3 gallons.
1 hot water urn—5 gallons.
3 large iron frying pans.
6 egg pans—8 eggs.
1 griddle—20".
1 Fryer—hotel—steel basket, 14".
3 roasting pans—15"x22"x3".
3 meat pans—12"x18"x2¼".
2 sauce pans—21 qt.—retinned.
2 sauce pans—16 qt.—retinned.
2 sauce pans—12 qt.—retinned.
2 sauce pans— 4 qt.—retinned.
10 bread pans—3¼"—retinned.
6 pans—gem—12 cups.
4 pans—cake—2¼" deep.
1 pan—dish—30 qt.—retinned.
1 pan—dish—14 qt.—retinned.
12 plates—pie—deep pyramid.
2 pans—pudding, 6 qt. deep.
1 coffee urn, 5 gal.
2 pans, pudding, 4 qt. shallow.
1 vinegar jug, 1 gallon.
1 syrup jug, 1 gallon.
1 tea cannister.
1 coffee cannister.
1 sugar cannister.
2 scoops, grocers.

1 salt box, large.
3 oval dish tubs, 22″x16″x6½″.
1 measure, graduated, pint.
1 measure, graduated, quart.
1 measure, graduated, gallon.
2 dippers, retinned, 1 gallon.
2 ladles, small.
2 ladles, large.
2 milk cans, 3 gallons.
1 large hotel potato masher.
1 rolling pin, hotel, 15″x3½″ dia.
1 Chinese strainer, large, hotel.
1 soup strainer.
3 tea strainers.
2 colanders, hotel, steel retinned, 19″.
1 flour sieve.
1 funnel, enameled, small.
1 funnel, enameled, large.
1 grater, bakers.
2 bread toasters.
3 cork screws.
4 can openers.
1 match box, japanned.
2 14″ cake turners, steel retinned.
1 squeezer, lemon.
1 mixing bowl, 40 qt. retinned.
2 mixing bowls, 14″ dia., earthenware.
1 mixing bowl, 24″ dia., wooden.
6 pans, milk, 6 qt.
1 stock pot, 25 gal., steel retinned, with cover, faucet and strainer.
1 stock pot, 9 gal., steel retinned.
1 soup pot, 14 gal., with lid.
1 C. I. kettle, 5 gal., with lid.
2 8 qt. double boilers, retinned.
1 fish boiler with strainer, retinned, 8 gal.

1 5 gal. stone crock, with cover.
2 3 gal. stone crocks, with cover.
1 12″x16½″ hotel broiler.
3 bread knives, 12″ blade.
1 butcher knife, 14″ blade.
2 butcher knives, 10″ blade.
6 paring knives, 3″ blade.
1 market cleaver, 8″ blade.
1 mincing knife, 5½″ blade.
1 slicing knife, 14″.
1 meat saw, 24″, with two extra blades.
2 flesh forks, 20″.
2 forks, cooks, 11″ tine.
1 meat chopper.
1 coffee mill, ¾-lb. hopper.
4 basting spoons.
4 mixing spoons, enameled.
3 wooden spoons.
1 biscuit cutter.
1 doughnut cutter.
1 cutting board, 24″x18″x3″.
3 oblong meat platters, 15″x20″.
1 5″ dough scraper.
1 12″ egg whip.
1 16″ egg whip.
1 set of skewers, 3½″ to 8½″.
1 18″ floor brush.
2 corn brooms.
6 scrub brushes.
2 pot cleaning chains.
1 24-lb. scale with scoop.
1 bread raiser, heavy retinned, 21 qt.
1 garbage can with cover, 15″x26″.
1 18 gal. galvanized tub.
1 1 gal. galvanized oil can.
2 ice picks.

1 pr. ice tongs.
1 claw hammer.
1 dust pan.
4 mops and handles.
2 Yale padlocks.
2 mouse traps.
3 12 qt. galvanized buckets.
1 stove rake.
1 shovel, fire, large.
1 5-gal. coffee boiler.
1 3-qt. coffee pot.
1 3-gal. tea boiler.
1 5-qt. tea pot, copper.
1 3-qt. tea kettle.
1 pr. 8″ trimming scissors.
1 small American axe.
1 wooden towel roller.

4. LINEN AND BEDDING.

2 elastic felt mattresses, 3′ 3″x6′ 6″.
8 elastic felt mattresses, 2′ 6″x6′ 6″.
50 felt mattresses, 2′ 2″x6′.
4 special feather pillows, extra grade.
70 special feather pillows.
200 Mohawk sheets.
112 Mohawk pillow cases.
44 colored pillow cases.
22 prs. Raymond blankets.
100 prs. Venus blankets.
8 white bedspreads.
64 colored bedspreads.
4 mattress covers, 3′ 3″x6′ 6″.
8 mattress covers, 2′ 6″x6′ 6″.
50 mattress covers, 2′ 2″x6′.
4 special pillow covers.
40 pillow covers.

352 hand towels.
84 bath towels.
48 3 yd. roller towels.
120 linen napkins.
12 linen table cloths.
60 dish towels.
1 tapestry table cover for saloon.
1 silence cloth for saloon.
1 silence cloth for P. O. mess.
4 laundry bags.
18 waste paper baskets.
2 oil cloths for saloon.
2 oil cloths for P. O. mess.
18 cuspidors.
8 oil cloths for crews' mess tables.

134. MACHINE SHOP EQUIPMENT.

The following tools will be fitted in engineer's work shop:

1 16" lathe.
1 vertical drill press.
1 grinder.
1 motor to suit.
Shafting, boxes, pulleys, etc.

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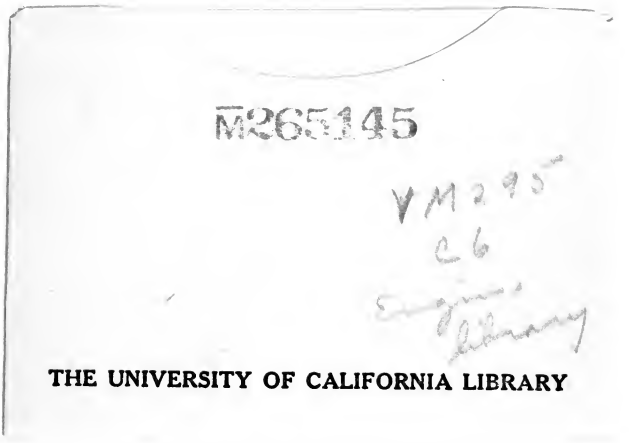
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